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# (54) Elastic damping assemblies

(57) Ball bearing assemblies 3 and 4 have their outer races 7 and 8 mounted in a tube 2 by annular damping rings 9, 10 reinforced by split or segmental thin-wall sleeves 11, 17 engaged form-lockingly in grooves 13, 19 in the outer races 7, 8.

In another arrangement the damping ring is in direct form-locking engagement with the outer race of other circular component and the damping ring may be in form-locking engagement with a split thin wall sleeve.

Fig.1

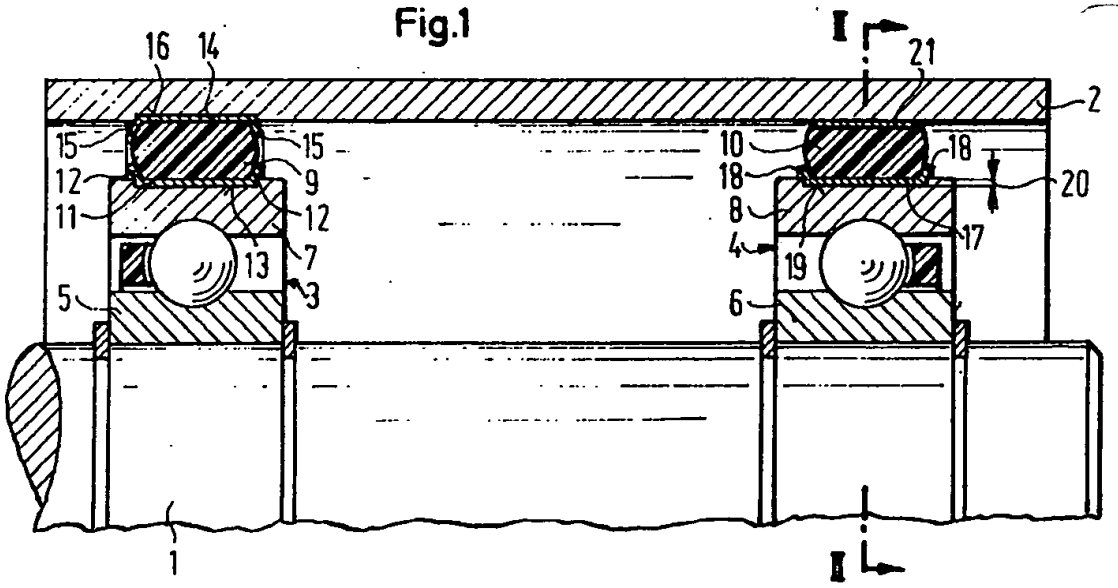


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Fig.1

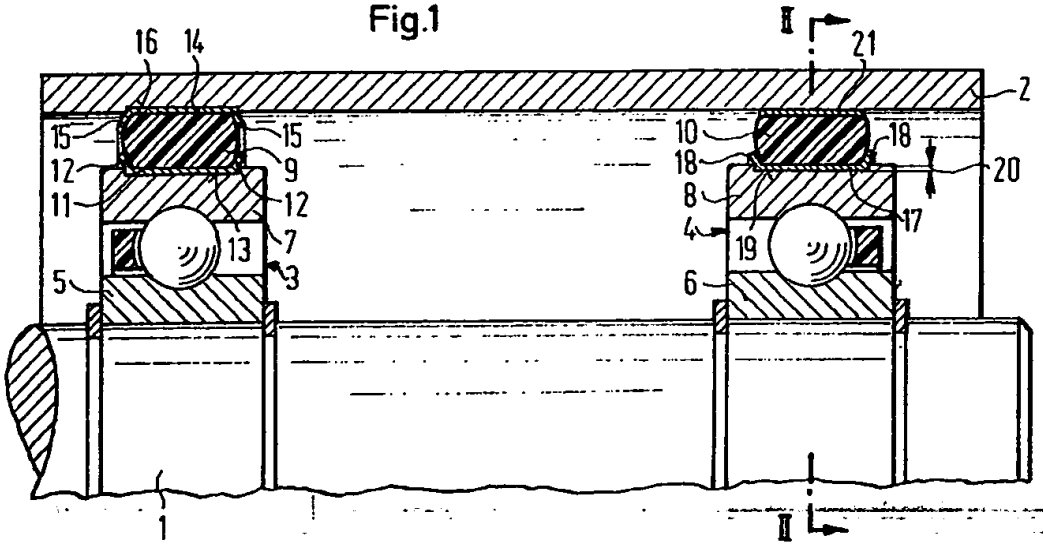



Fig.2

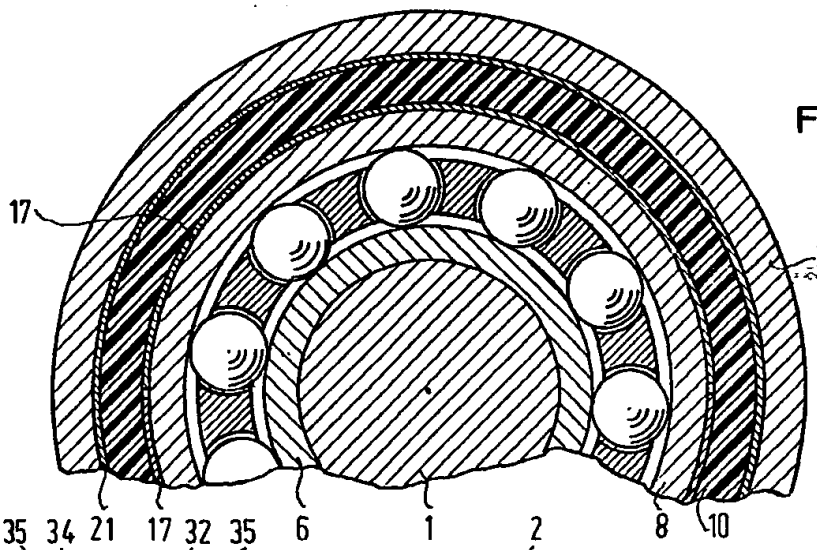
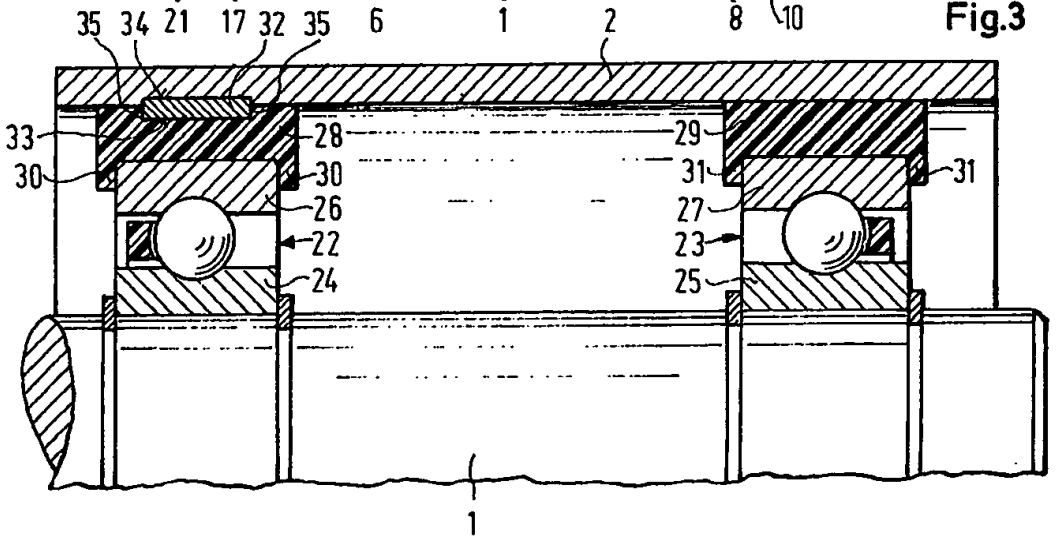



Fig.3



SPECIFICATION

**Elastic damping assemblies**

The invention relates to elastic damping assemblies comprising a first cylindrical or annular component and an elastic damping member comprising rubber, plastics material or the like, for supporting the first component relative to a concentric second cylindrical or annular component, which damping member is in the form of a circular ring and is reinforced at at least one of its cylindrical surfaces, with a thin-walled sleeve.

Damping members of this kind are used for example for supporting components which rotate at high speeds, in order on the one hand to damp the vibrations which occur in such components and on the other hand to reduce the noise level.

So that it can meet these requirements, the elastic damping member must be installed under a relatively high degree of pre-stress; this is not possible, or is possible only under difficult conditions, particularly when axial displacement of the elastic damping member in the adjoining component is required in the course of assembly. In addition, care must be taken that axial creep movement of the elastic damping member is also prevented in the event of a possible decline in the pre-stressing.

In order to provide remedial measures in this respect, it has already been proposed that the elastic damping member may be reinforced with a thin-walled sleeve, at least at one of its cylindrical surfaces. Although this arrangement makes it possible for the elastic damping member to be assembled with a prestress and also makes it possible to facilitate axial displacement, there is the disadvantage that very close tolerances must be observed between the sleeve and the adjoining component, the maintaining close tolerances of this kind has a disadvantageous effect from the point of view of cost. Furthermore, measures must be taken in order to prevent axial creep of the elastic damping member.

According to the invention, there is provided an elastic damping assembly comprising a first cylindrical or annular component and a damping member of elastic damping material for supporting the first component concentrically with respect to a second cylindrical or annular component the damping member being in the form of a circular ring reinforced at at least one of its cylindrical surfaces with a thin-walled sleeve, wherein the sleeve is split at at least one peripheral position, is connected to the elastic damping member and engages form-lockingly into a peripheral groove in the first component. This construction provides the advantage that the elastic damping member can be assembled with a high level of pre-stressing, without any particular fine machining operation. Both the connection between the sleeve and the elastic damping member and the form-locking connection between the sleeve and the adjoining component provide a safeguard against axial creep movement even when the pre-stressing in the elastic damping member declines somewhat after a prolonged period of operation.

A simple connection between the sleeve and the elastic damping member is achieved by the sleeve and the elastic damping member being form-lockingly connected together by one of said members having approximately radially extending flanges which engage over the ends of the other member.

It is also possible however for the sleeve and the damping member to be fixedly bonded together for example by adhesive or vulcanisation. In both cases, it is possible for a high degree of pre-stressing to be induced in the elastic damping member, and for a permanent connection between the sleeve and the elastic damping member to be produced, at low cost.

In preferred embodiments of the invention, the sleeve is in the form of a sheet metal member. Using a thin-walled springy metal sheet ensures that the sleeve is safety held in the peripheral groove in the adjoining component.

In a modified form of the invention the sleeve is subdivided into segments. Such a construction may be advantageous, both from the point of view of manufacturing reasons and also in regard to assembly.

It is also possible for both surfaces of the elastic damping member to be reinforced with a sleeve. This arrangement makes it possible not only to secure the elastic damping member to prevent axial creep thereof, but at the same time permits the adjoining components to be fixed axially relative to each other.

Conveniently, the depth of the peripheral groove is equal to or less than the wall thickness of the sleeve. This arrangement provides the advantage that the pre-stressing force in the elastic damping member is reduced to only a negligible degree, when the sleeve is snapped into the peripheral groove.

Embodiments of the invention will now be described in greater detail by way of example with reference to the drawings, in which:

*Figure 1* is a view in longitudinal section of an arrangement of an elastic damping assembly according to the invention,

*Figure 2* is a view in section taken along line II–II in Fig. 1, and

*Figure 3* is a view in longitudinal section of another embodiment.

Referring to Fig. 1 and 2, ball-bearing assemblies 3 and 4 are provided for supporting a rotary shaft 1 in a tubular component 2. The inner races 5 and 6 of the ball-bearing assemblies 3 and 4 are fixedly connected to the shaft 1. Elastic damping members 9 and

10 are disposed between the outer races 7 and 8 and the tubular component 2.

At its innersurface, the elastic damping member 9 is reinforced with a split sleeve 11 which has approximately radially outwardly directed flanges 12 at both ends, for engaging around the elastic damping member 9 on the one hand, while on the other hand the sleeve 11 engages form-lockingly into a peripheral groove 13 in the outer race 7.

A split sleeve 14 is provided at the outer peripheral surface of the elastic damping member 9. The sleeve 14 has approximately radially inwardly directed flanges 15 at both of its ends, for engaging around the elastic damping member 9 on the one hand, while on the other hand, the sleeve 14 engages into the peripheral groove 16 in the tubular component 2.

Referring now in particular to Fig. 2, at its inner peripheral surface the elastic damping member 10 has a sleeve formed by separate individual segments 17 instead of a split sleeve 11. The segments 17 having approximately radially outwardly directed flanges 18 which engage around the elastic damping member 10 on the one hand, while on the other hand the segments 17 engage form-lockingly into the peripheral groove 19 in the outer race 8. In the embodiment illustrated (Fig. 1), the depth 20 of the peripheral grooves 13, 16 and 19 corresponds to the wall thickness of the sleeves 11 and 14 and the segments 17.

At its outer peripheral surface, the elastic damping member 10 is reinforced with a split sleeve 21 which comprises a flat strip and which is secured to the elastic damping member 10 by adhesive or vulcanisation.

In the embodiments shown in Fig. 3, the rotary shaft 1 is supported in the tubular component 2 by ball-bearing assemblies 22 and 23 comprising inner races 24 and 25 which are fixedly connected to the shaft 1. Elastic damping members 28 and 29 are disposed between the outer races 26 and 27 and the tubular components 2. The elastic damping members 28 and 29 have radially inwardly extending flanges 30 and 31 which engage around the end faces of the outer races 26 and 27.

At its outer peripheral surface, the elastic damping member 28 is reinforced with a split sleeve 32 which comprises a flat strip and which is form-lockingly engaged into a groove 33 in the elastic damping member 28 on the one hand, and into a peripheral groove 34 in the tubular component 2 on the other hand. In this arrangement, the flanges 35 of the elastic damping member 28 engage around the end faces of the sleeve 32.

## CLAIMS

1. An elastic damping assembly comprising a first cylindrical or annular component and a damping member of elastic damping material for supporting the first component concentrically with respect to a second cylindrical or annular components, the damping member being in the form of a circular ring reinforced at at least one of its cylindrical surfaces, with a thin-walled sleeve, wherein the sleeve is split at at least one peripheral position, is connected to the elastic damping member and engages form-lockingly into a peripheral groove in the first components.

2. An assembly accordingly to claim 1 wherein the depth of the peripheral groove is equal to or less than the wall thickness of the sleeve.

3. An elastic damping assembly accordingly to claim 1 or 2 wherein the sleeve and the elastic damping member are form-lockingly connected together by one of said two members having approximately radially extending flanges which engage over the ends of the other member.

4. An assembly according to claim 1 or 2 wherein the sleeve and the damping member are bonded together.

5. An assembly according to any of the preceding claims wherein the thin-walled sleeve is formed of sheet metal.

6. An assembly according to any of the preceding claims wherein the sleeve is subdivided into segments.

7. An assembly according to any of the preceding claims, wherein both surfaces of the elastic damping member are reinforced with a sleeve.

8. An elastic damping assembly comprising a first cylindrical or annular component and a damping member of elastic damping material for supporting the first component concentrically with respect to a second cylindrical or annular component, the damping member being in the form of a circular ring.

9. An assembly according to any of the preceding claims, wherein one of the said components is a race of a rolling bearing.

10. An elastic damping assembly substantially as hereinbefore described with reference to Figs. 1 and 2 or Fig. 3 of the accompanying drawings.

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